REMARKS

Claims 1-22 are pending in the application, and are rejected. Claims 1 and 13 are herein amended. No new matter has been added.

Claim Rejections - 35 U.S.C. §112

Claims 13-22 are rejected under 35 U.S.C. §112, second paragraph as being indefinite. The Examiner asserts that Claim 13 is indefinite because it is unclear whether the claim is a process or apparatus.

Applicants respectfully submit that the claim is sufficiently clear that it is a method claim based on the use of a previously claimed apparatus. Nevertheless, in the interest of clarity, Applicants herein rewrite claim 13 into a clear process claim, which includes the step of providing the apparatus of claim 1, and then using the apparatus of claim 1. Applicants submit that this change fully addresses the rejection.

Claim Rejections – 35 U.S.C. §103(a)

Claims 1-5, 11-14 and 20-22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kadokura (JP 2003-155564) in view of Kadokura (U.S. Pat. 4,784,739).

The Examiner asserts that a difference between the primary reference and the present invention is an auxiliary electrode to absorb electrons in a plasma confinement space being provided in the interior of the sputtering unit (Claim 1), locating the auxiliary electrode in front of the electron reflecting means is not discussed (Claim 3), locating the auxiliary electrode in the

vicinity of a center line of the plasma confinement space is not discussed (Claim 4), the center line extending along a direction parallel to the longer sides of the targets is not discussed (Claim 5), and the substrate being an organic substrate is not discussed (Claim 22).

Regarding claims 1 and 3, the Examiner asserts that Kadokura '739 teach providing an anode electrode 130 in the shape of a ring arranged around the front of the reflecting electrode 110. The motivation for utilizing an anode electrode in a facing target sputtering device is that it allows for capturing electrons (column 7 lines 52-64). The Examiner concludes that it would have been obvious to have modified Kadokura '564 by utilizing an auxiliary electrode as taught by Kadokura '739 because it allows for capturing electrons.

Applicants note that the present invention was filed in the U.S. on November 26, 2003, and claims priority to Japanese Application No. 2003-280634, filed on July 28, 2003. The primary prior art reference to Kadokura '564 was published on May 30, 2003, which was less than two months before the priority date of the Japanese parent application.

Applicants submit that they are able to establish an earlier invention date than Kadokura '564. Specifically, Applicants submit that they can establish a reduction to practice prior to the effective date of Kadokura '564.

Applicants submit that the inventors discovered the idea to provide an auxiliary electrode that absorbs the thermalized electrons in the plasma confinement space in the sputtering apparatus before Kadokura '564 was published, namely, May 30, 2003. Applicants submit herewith a copy of the drawing plans and the purchasing slip for the blind plate to which Cu pipes were blazed. Applicants note that the blind plate and copper pipes in the plan correspond

to the closure plate 72e and rod-like electrodes 201,202,203 in Figs. 5 and 6 of the present application. Applicants note that the plan and the purchasing slip were made May 20, 2003 and May 25, 2003, respectively. Therefore, Applicants submit that Kadokura '564 has been antedated, and therefore could not be cited against the present application. Applicants will forward a Declaration under 37 C.F.R. 1.131 shortly, which will include the above information.

Moreover, Applicants disagree with the above rejection because not all of the claimed limitations are present even if the cited references were properly combined.

Applicants note that in the conventional box-shaped facing-targets sputtering apparatus, thermalized electrons filled in the plasma confinement space drift through the opening face of the sputtering unit and reach the surface of the substrate, to thereby generate Joule heat, that is, the thermalized electrons become a critical factor for heating of the substrate (see the specification p. 6 line 24-p. 8 line 21) Therefore, the conventional box-shaped facing-targets sputtering apparatus has a problem that it is difficult to form a high-quality film while keeping the substrate at a low temperature. The problem was solved, in accordance with the present invention, by providing an auxiliary electrode in the middle of a plasma confinement space in addition to the proper anode. The auxiliary electrode provided in the sputtering apparatus of the present invention is able to absorb directly the thermalized electrons in the space Therefore, according to the present invention, thermalized electrons which would reach the substrate can be remarkably reduced, and heating of the substrate caused by the thermalized electrons can be effectively restrained.

With regard to Kadokura '739, Applicants note that the anode electrode 130 in Kadokura '739 is provided as an anode of the sputtering apparatus, namely, an electrode that supplies a

sputtering power to the cathode of the target T. Therefore, the anode electrode 130 corresponds to the proper anode of the present invention which substantially consists of the frame 71 and closure plates 72c through 72e, and is technologically different from the auxiliary electrode of the present invention which is provided in addition to the proper anode which supplies the sputtering power.

Applicants note that Kadokura '739 describes that the anode electrode 130 captures γ-electrons (column 7, lines 51-58). The γ-electrons that are emitted from targets by the sputtering and have high energy constitute the sputtering current. Therefore, it is obvious that the anode electrode 130 corresponds to the proper anode of the present invention and is clearly different from the auxiliary electrode which absorbs mainly thermalized electrons that have lost energy.

The anode electrode 130 is so placed to control the sputtering power by conditioning the impedance between the anode electrode 130 and the target T through arranging the distance between them, and consequentially control the erosion of the target and the thickness of the thin film, that is, the film formation rate, because Kadokura '739 mentions, "by adjusting the location of the anode electrode 130, it is possible to control the erosion of the target T and the thickness of a sputtered material film on the substrate S" (column 7 lines 59-62). Therefore, it is clear that the anode electrode 130 is the anode that supplies a sputtering power to the cathode of the target T.

Referring to the other embodiments in connection with the above mention, the anode electrode 130 indicated in Figs. 5 and 6 is a plate-like electrode and is constructed so as to also used as a sputtering shield element (see column 8 lines 66-68), and arranged completely outside

of the plasma confinement space. And it is obvious that the anode electrode 130 of the latter embodiments equally operates as the anode electrode 130 indicated in Fig. 3, because Kadokura '739 mentions, "It should be understood that the same reference numerals as those in Figs. designate the same or like elements" (column 8 lines (16-68).

Further, as mentioned above, it is not described in Kadokura '739 that an electrode is arranged in a plasma confinement space. That is to say, plasma is not illustrated in Figs 3, 4 and 11, while a magnetic flux that confines plasma is merely indicated in Fig. 4. Although plasma is generally considered to be confined inside of this flux, Fig. 4 shows that the anode electrode 130 is located a little outside of the flux. And the anode electrode 130 is located clearly outside of a plasma confinement space in Figs 5 and 6. Therefore, it is clear that arranging the anode electrode 130 in a plasma confinement space is not disclosed in Kadokura '739.

Furthermore, Applicants submit that arranging any other electrode than this anode electrode 130 that supplies sputtering power is not described in Kadokura '739.

As mentioned above, the anode electrode 130 of Kadokura '739 supplies a sputtering power and corresponds W the anode electrode of the present invention. Furthermore, Kadokura '739 does not disclose any other electrode. The present invention is characterized in that it has the auxiliary electrode in the plasma confinement space and solves a new problem proper to the box-shaped facing-targets sputtering apparatus, which is not disclosed in either Kadokura '739 or Kadokura '564. The new problem is that thermalized electrons drift to the substrate and heat it. The present invention performs the unique operation, that is, absorbing thermalized electrons and moderating the heat of the substrate, then solving the problem which does not occur in the

conventional side-open-type sputtering apparatus described in Kadokura '739. Therefore, the present invention would not be obvious to one of ordinary skill in the art over Kadokura 564 and Kadokura '739 even if Kadokura '564 would have been published before the present invention was made.

Claims 15-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kadokura '564 in view of Kadokura '739 as applied to claims 1-5, 11-14 and 20-22 above, and further in view of Kiyota (U.S. Pat 6,685,805). Claims 18 and 19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kadokura '564 in view of Kadokura '739 as applied to claims 1-5, 11-14 and 20-22 above, and further in view of Kim (U.S. Pat. 5,240,581).

As noted above, Applicants submit that they are able to establish an earlier invention date than Kadokura '564. Specifically, Applicants submit that they can establish a reduction to practice prior to the effective date of Kadokura '564. Therefore, Applicants submit that Kadokura '564 has been antedated, and therefore could not be cited against the present application.

Further as noted above, even if Kadokura '564 were not antedated, Applicants submit that all of the limitations are not taught or suggested by the combination of the cited references.

Still further, with regard to U.S. 6,685,805 to Kiyota, Applicants note that Kiyota '805 discloses manufacturing a substrate having a transparent conductive film under an atmosphere comprising a mixed gas, wherein a ratio of oxygen to argon in a range of 0.016 to 0.018 (see claim l). It also discloses there is a lack of oxygen resulting in an ITO film with many oxygen

defects and poor crystallinity, hence the mobility is extremely low when the oxygen proportion is below 0.016 (column 6 lines 21-24). No particular numerical value is described in column 4 lines 55-59 of Kiyota '805 that is indicated by the Examiner. And column 8 lines 15-17 shows that 1000 SCCM of Ar gas and 10 SCCM of O_2 gas were introduced. However, that is not the condition under which an ITO film is formed by sputtering because these gases were introduced to remove impurities from the surface of the substrate (Column 8 lines 18-20). The oxygen proportions of the Examples are shown in TABLE 1 and they are 0.016-0.018. Therefore, Kiyota '805 does not disclose that a sputtering gas contains oxygen in an amount of 1 vol. % or less.

Claims 6 and 7 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kadokura '564 in view of Kadokura '739 as applied to claims 1-5, 11-14 and 20-22 above, and further in view of Madocks (U.S. 2004/0149574).

As noted above, Applicants submit that they are able to establish an earlier invention date than Kadokura '564. Specifically, Applicants submit that they can establish a reduction to practice prior to the effective date of Kadokura '564. Therefore, Applicants submit that Kadokura '564 has been antedated, and therefore could not be cited against the present application.

Further as noted above, even if Kadokura '564 were not antedated, Applicants submit that all of the limitations are not taught or suggested by the combination of the cited references.

Still further, with respect to Madocks (U.S. 2004/0149574), Applicants note that the surrounding electrode 13 is arranged on the outside of the plasma 17 (see Figs. 1 and 2). Further, the electrode 13 does not absorb electrons of the Hall current because the Hall current is confined to region 20 in an endless loop (left column of page 3, lines 54-56). Therefore, the electrode 13 of Madocks is clearly different from the auxiliary electrode of the present invention.

Double Patenting

Claims 1-12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Patent No. 6,881,311 in view of Kadokura (U.S. Pat. 4,784,739) and Madocks (U.S. PG Pub 2004/0149574).

The Examiner asserts that the motivation for providing a shaped anode is that it allows for capturing electrons. (See Madocks abstract). The Examiner concludes that it would have been obvious to have modified U.S. Pat. No. 6,881,311 by providing an auxiliary electrode to absorb electrons as taught by Kadokura and Madocks because it allows for capturing electrons.

Applicants respectfully disagree with the rejection, because not all of the claimed limitations are met by the cited combination of references.

Applicants note that the sputtering apparatus described in U.S. Patent No. 6,881,311 does not have an auxiliary electrode which absorbs electrons filled in the plasma confinement space between targets, and the idea that an auxiliary electrode should be arranged in the plasma confinement space in the interior of the sputtering unit to absorb thermalized electrons filled in the plasma confinement space is novel and unique as mentioned above. Therefore, any of the

claims of this application should not be rejected under the judicially doctrine of obviousness-type double patenting.

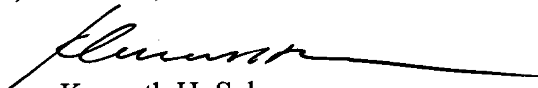
In view of the aforementioned amendments and accompanying remarks, Applicants submit that that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP



Kenneth H. Salen
Attorney for Applicants
Registration No. 43,077
Telephone: (202) 822-1100
Facsimile: (202) 822-1111

KHS/-

Enclosures: Drawing plans (2 sheets) for present invention, dated May 20, 2003
Processing slip for material for present invention, dated May 25, 2003
Translation of processing slip dated May 25, 2003, with notes

Attachment

TRANSLATION

Suntech

2003. 5. 25

F. T. S. Corporation
192-0024 Hachioji-shi Utsukimachi 940-165
TEL: 0426-45-8224 / FAX: 0426-45-8231
Sadao Kadokura

Processing Slip (SUS03 · FJ09)

1. Subject: Vacuum Parts Processing

2. Quantity: 1 set

3. Sum: ¥ 517,650(with 5 % consumption tax: Based on Estimation 030511)

4. Appointed date of delivery: 2003. 6. 10 strictly kept

5. Delivery place: F. T. S. Corporation

6. Terms: Closing at the end of the month and deposit into the account at the end of 2 months later

7. Detailed processing: Arrangement based on plans

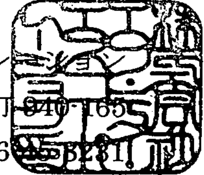
Head	Plan Code	Quantity	Unit Price(¥)	Sum Price(¥)
Hexahedral lattice body	FTS-U340-101	1		205,000
AB side pillow	FTS-U340-101	2	80,000	160,000
E side blind plate	FTS-U340-201	1		58,000
MAG pillow	FTS-U340-302	2	80,000	70,000
Sum (I)				493,000
Consumption tax				24,650
Sum (II)				517,650

Notes: Hexahedral lattice body, AB side pillow, E side blind plate and MAG pillow in the above table correspond to a rectangular parallelepiped frame 71, a backing unit 113a, a closure plate 72e and a support unit 150a in the specification respectively.

Attachment

サンテック　殿

2003.5.25



㈱エフ・テイ・エスコーポレーション
〒192-0024　八王子市宇津木町940-165
電話：0426-45-8224/ＦＡＸ：0426-45-8231
門倉　貞夫

加工伝票　（ＳＵＳ03-ＦＪ09）

1. 件名：　真空部品加工

2. 数量：　１式

3. 金額：　517,650　円（５％消費税込み：見積　030511 に準拠）

4. 納期：　2003.6.10 厳守

5. 納品場所：　㈱エフ・テイ・エスコーポレーション

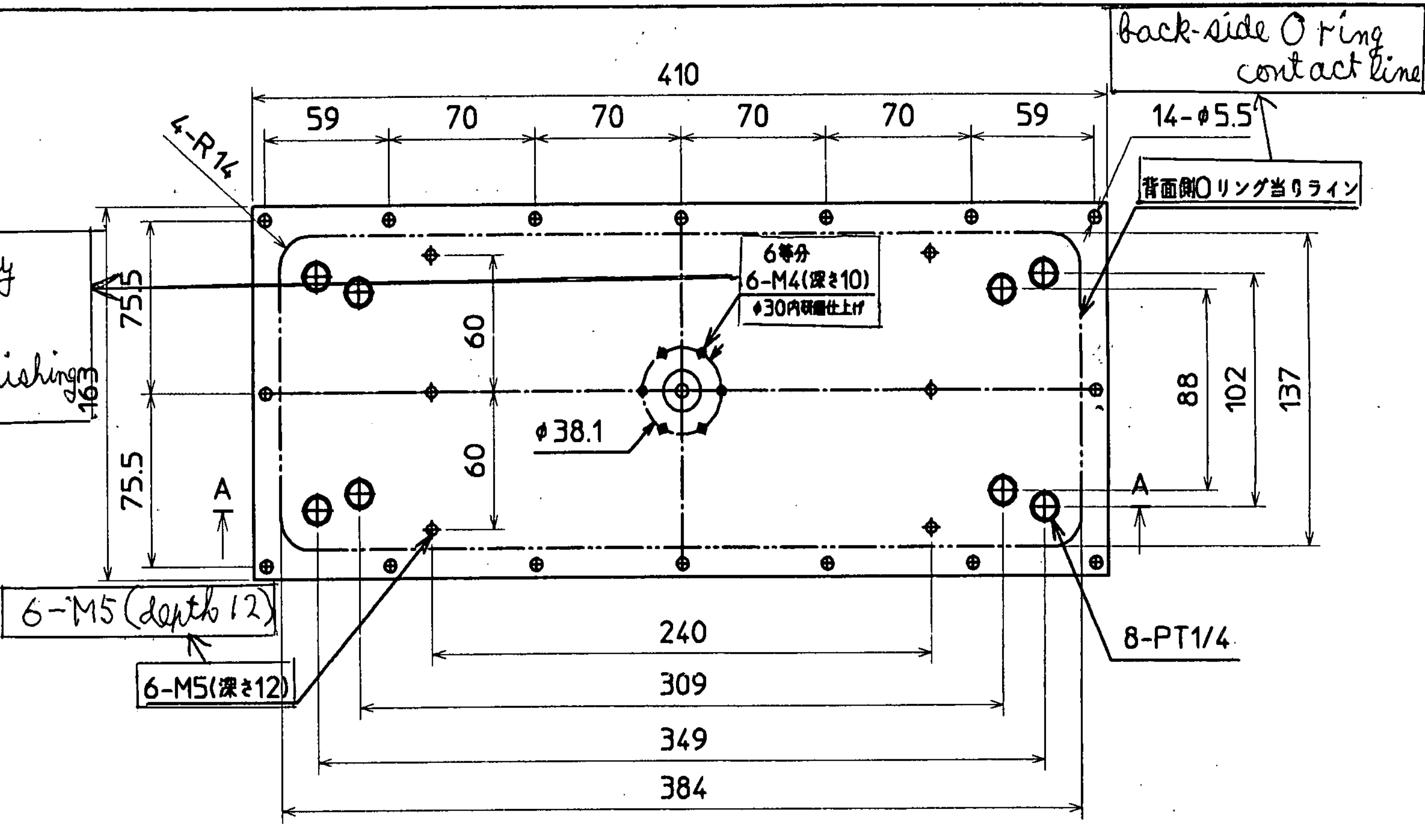
6　支払条件：　月末締翌々月末銀行振込

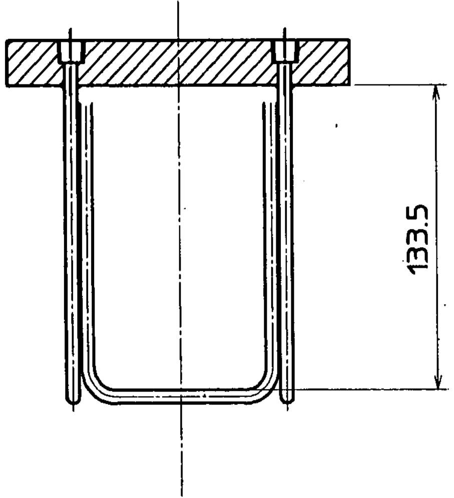
7　加工内容詳細：　図面打合せ

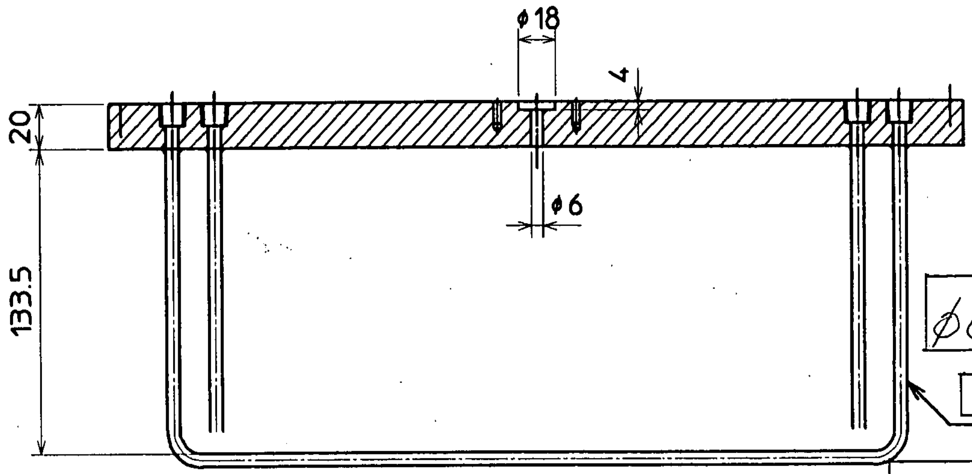
番号	図版	数量	単価（円）	金額〔円〕
六方格子体	FTS-U340-101	1		205,000
ＡＢ面ピロー	FTS-U340-103	2	80,000	160,000
Ｅ面めくら板	FTS-U340-201	1		58,000
ＭＡＧピロー	FTS-U340-302	2	35,000	70,000
合計（Ｉ）				493,000
消費税				24,650
合計(II)				517,650

以上

指示のない仕上部分の寸法許容差			
寸法の区分	A級	B級	C級
0.5-3	±0.05	±0.1	—
3-6	±0.05	±0.1	±0.2
6-30	±0.1	±0.2	±0.5
30-120	±0.15	±0.3	±0.8
120-315	±0.2	±0.5	±1.2
315-1000	±0.3	±0.8	±2
1000-2000	±0.5	±1.2	±3







E side Blind Plate

注) 指示ナキ各稜糸面トリノコト

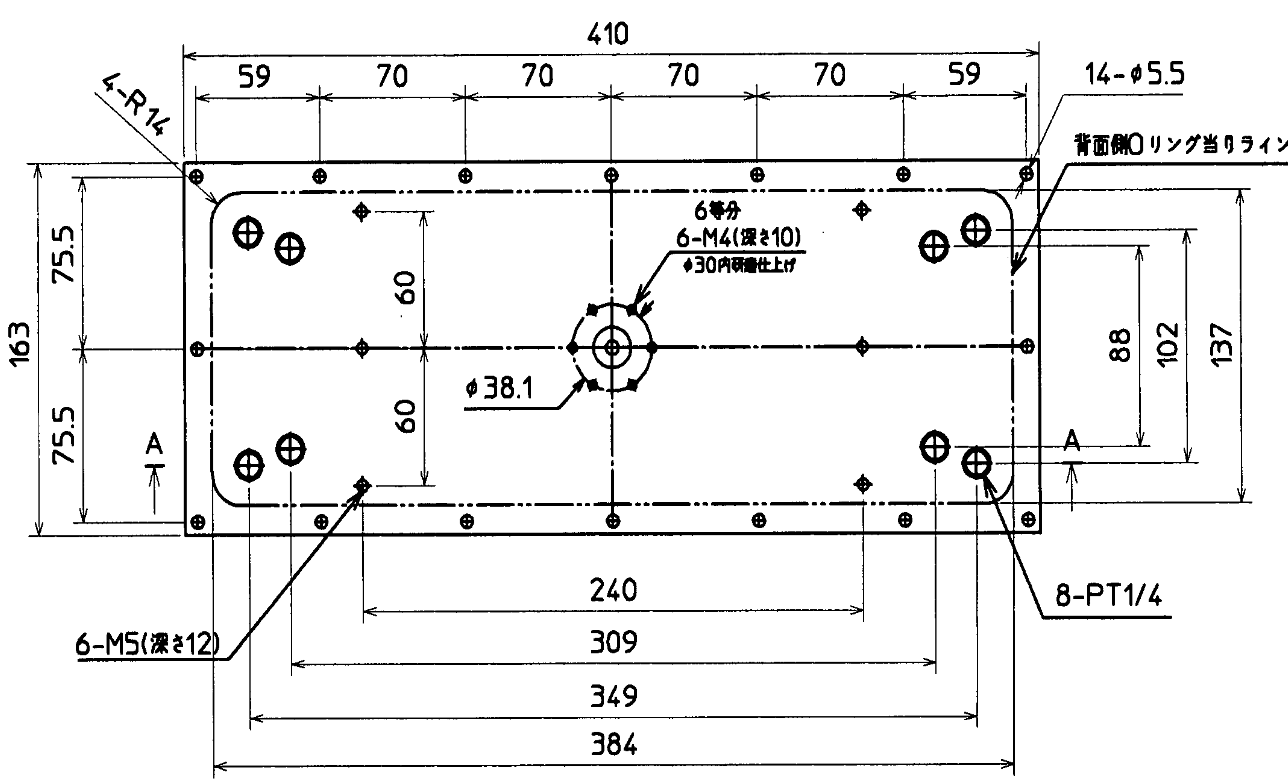
TGT_HUM

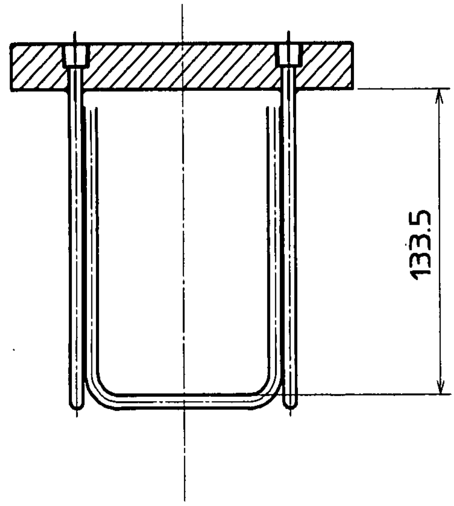
03.05.20 東芝向け図面整理	
個数	1ヶ
材料	C 1020 P
尺度	1/2.5
名称	E面盲板
図番	FTS-U340-201

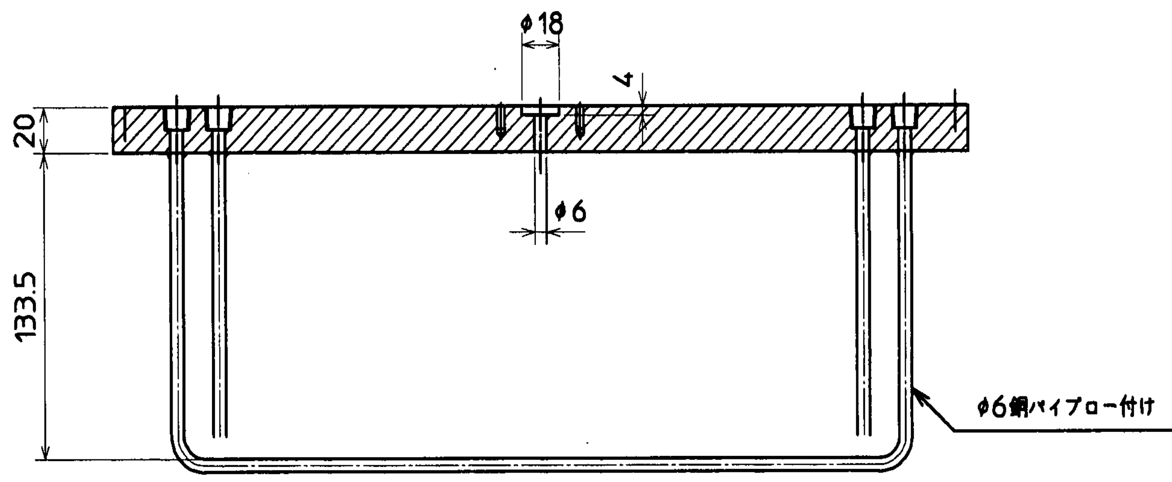
copy

寸法の区分	指定のない仕上部分の寸法許容差 上下寸法差 A級	B級	C級
0.5-3	±0.05	±0.1	—
3-6	±0.05	±0.1	±0.2
6-30	±0.1	±0.2	±0.5
30-120	±0.15	±0.3	±0.8
120-315	±0.2	±0.5	±1.2
315-1000	±0.3	±0.8	±2
1000-2000	±0.5	±1.2	±3

Attachment







注) 指示ナキ各稜糸面トリノコト

TGT_HUM

03.05.20 東芝向け図面整理	
個数 1ヶ	材料名 C 1020 P
尺度 1/2.5	三角法
名称	E 面 盲 板
図番	FTS-U340-201